IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-8 (Canceled)

9. (Original) A method for chemical vapor deposition comprising communicating reactant gas through a reactor chamber such that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

10. (Original) A method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber via a channel formed intermediate the chamber and a spindle driven wafer carrier, wherein a distance between the chamber and the wafer carrier is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

11. (Original) A method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor.

12. (Original) A method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a rotating wafer carrier.

13. (Original) A method for chemical vapor deposition comprising effecting, at least partially, generally radial flow of reaction gases within a reactor via centrifugal force.

14. (Original) A method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected partially by a gas inlet disposed generally centrally within the chamber and at least one gas outlet dispose generally peripherally within the chamber and partially by rotation of a wafer carrier.

15. (Original) A method for chemical vapor deposition comprising effecting generally radial laminar flow within a reactor by providing reaction gas to a chamber of the reactor via a centrally located reaction gas inlet and by exhausting reaction gas from the chamber via at least one

peripherally located reaction gas outlet disposed entirely above an upper surface of a wafer carrier.

16. (Original) A method for chemical vapor deposition comprising supplying a plurality of chambers with reactant gases from a common gas supply.

17. (Original) A method for chemical vapor deposition comprising removing gas from the chambers via a common gas exhaust system.

18. (Original) A method for chemical vapor deposition reactor comprising flowing reactant gas over a wafer carrier without substantially flowing substantially flowing reactant gas below the wafer carrier.

19. (Original) A method for chemical vapor deposition reactor comprising flowing reaction gas through a chamber and out of a gas outlet formed in the chamber entirely above an upper surface of a wafer carrier such that laminar gas flow is enhanced.

Claims 20-62 (Canceled)

63. (Original) A method for chemical vapor deposition, the method comprising:

providing a chamber containing a wafer carrier;

rotating the wafer carrier with a spindle;

effecting generally laminar flow of gas intermediate a portion of the chamber and the wafer carrier.

64. (Original) The method as recited in claim 63, wherein a distance between the wafer carrier and the portion of the chamber is small enough for centrifugal force caused by rotation of the wafer carrier to effect outward movement of gas within the channel.

65. (Original) The method as recited in claim 63, wherein a reaction gas comprises reactants and a distance between the wafer carrier and the portion of the chamber is small enough that a substantial portion of the reactants in the reaction gas contact a surface of a wafer prior to exiting

the chamber.

66. (Original) The method as recited in claim 63, wherein a reaction gas comprises reactants and a distance between the wafer carrier and the portion of the chamber is small enough that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

67. (Original) The method as recited in claim 63, wherein a distance between the wafer carrier and the portion of the chamber is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

68. (Original) The method as recited in claim 63, wherein the distance between the wafer carrier and the portion of the chamber is less than approximately 2 inch.

69. (Original) The method as recited in claim 63, wherein the distance between the wafer carrier and the portion of the chamber is between approximately 0.5 inch and approximately 1.5 inch.

70. (Original) The method as recited in claim 63, wherein the distance between the wafer carrier and the portion of the chamber is approximately 0.75 inch.

71. (Original) The method as recited in claim 63, further comprising a gas inlet formed above the wafer carrier and generally centrally with respect thereto.

72. (Original) The method as recited in claim 63, wherein the chamber is defined by a cylinder.

73. (Original) The method as recited in claim 63, wherein the chamber is defined by a cylinder having one generally flat wall thereof defining a top of the chamber and a reaction gas inlet is formed at approximately a center of the top of the chamber.

74. (Original) The method as recited in claim 63, further comprising introducing gas into the chamber via a reaction gas inlet is disposed generally coaxially with respect to axis of the wafer carrier.

75. (Original) The method as recited in claim 63, wherein reaction gas is introduced into the

chamber via a gas inlet which has a diameter which is less that 1/5 of a diameter of the chamber.

76. (Original) The method as recited in claim 63, wherein reaction gas is introduced into the chamber via a gas inlet which has a diameter which is less than approximately 2 inches.

77. (Original) The method as recited in claim 63, wherein reaction gas is introduced into the chamber via a gas inlet which has a diameter which is between approximately .25 inch and approximately 1.5 inch.

78. (Original) The method as recited in claim 63, wherein a reaction gas is constrained to flow generally horizontally.

79. (Original) The method as recited in claim 63, wherein a reaction gas is constrained to flow generally horizontally through a channel defined by cooperation of the chamber and a wafer carrier.

80. (Original) The method as recited in claim 63, wherein a reaction gas is caused to flow outwardly at least partially by a rotating wafer carrier.

81. (Original) The method as recited in claim 63, wherein at least one reaction gas flows out of the chamber via an outlet formed in the chamber above a wafer carrier.

82. (Original) The method as recited in claim 63, wherein at least one reaction gas outlet is formed in the chamber above a wafer carrier and below a top of the chamber.

83. (Original) The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

at least one reaction gas outlet is formed in the chamber; and

the wafer carrier is disposed within the chamber below the gas outlet(s) so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

84. (Original) The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber;

the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet; and

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet.

85. (Original) The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber;

the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet;

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser comprising:

a substantially hollow annulus having an inner surface and an outer surface;

a plurality of openings formed in the inner surface;

a plurality of openings form in the outer surface; and

wherein openings in the inner surface enhance uniformity of reaction gas flow

over the wafer carrier.

86. (Original) The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber above a wafer carrier;

the wafer carrier is disposed within the chamber so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet;

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser comprising:

a substantially hollow annulus having an inner surface and an outer surface;

a plurality of openings formed in the inner surface;

a plurality of openings form in the outer surface; and

wherein the openings in the inner surface are configured so as to create enough restriction to reaction gas flow therethrough so as to enhance a uniformity of reaction gas flow over the wafer carrier.

87. (Original) The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber above a wafer carrier;

the wafer carrier is disposed within the chamber so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and

out of the chamber via the reaction gas outlet; and

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser being comprised of a material which is resistant to deterioration caused by heated ammonia.

88. (Original) The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber above a wafer carrier;

the wafer carrier is disposed within the chamber so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet; and

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser being comprised of at least one of graphite, SiC coated graphite, SiC quartz, or molybdenum.

89. (Original) The method as recited in claim 63, further comprising:

supporting a plurality of wafers via the wafer carrier; and

mitigating reaction gas flow out of the chamber, other than from the reaction gas outlet, via a seal disposed intermediate the wafer carrier and the chamber

90. (Original) The method as recited in claim 63, further comprising:

supporting a plurality of wafers via the wafer carrier; and

mitigating reaction gas flow out of the chamber, other than from the reaction gas outlet, via a ring seal disposed intermediate the wafer carrier and the chamber.

91. (Original) The method as recited in claim 63, further comprising:

supporting a plurality of wafers via the wafer carrier; and

mitigating reaction gas flow out of the chamber, other than from the reaction gas outlet, via a ring seal disposed intermediate the wafer carrier and the chamber, the ring seal being configured, the ring seal comprising at least one of graphite, quartz, and SiC.

92. (Original) The method as recited in claim 63, further comprising heating at least one wafer disposed within the chamber via a heater assembly disposed outside of the chamber and proximate the wafer carrier.

93. (Original) The method as recited in claim 63, further comprising heating at least one wafer disposed within the chamber via an induction heater assembly disposed outside of the chamber and proximate the wafer carrier.

94. (Original) The method as recited in claim 63, further comprising heating at least one wafer disposed within the chamber via a radiant heater assembly disposed outside of the chamber and proximate the wafer carrier.

95. (Original) The method as recited in claim 63, further comprising:

heating at least one wafer disposed within the chamber via a heater assembly disposed outside of the chamber and proximate the wafer carrier; and

mitigating contact of reaction gas with the heater via a heater purge system.

96. (Original) The method as recited in claim 63, further comprising controlling an amount of reactant gases introduced into the chamber via a gas flow controller.

97. (Original) The method as recited in claim 63, further comprising:

providing a carrier gas to the chamber via a carrier gas inlet in fluid communication with the reaction gas inlet;

providing an alkyl to the chamber via an alkyl inlet in fluid communication with the carrier gas inlet; and

providing ammonia to the chamber via an ammonia inlet in fluid communication with the carrier gas inlet.

98. (Original) The method as recited in claim 63, further comprising:

providing a carrier gas to the chamber via a carrier gas inlet in fluid communication with the reaction gas inlet;

providing an alkyl to the chamber via an alkyl inlet in fluid communication with the carrier gas inlet;

providing ammonia to the chamber via an ammonia inlet in fluid communication with the carrier gas inlet; and

wherein the alkyl inlet and the ammonia inlet are disposed proximate the chamber so as enhance separation of alkyls and ammonia prior to introduction thereof into the chamber.

99. (Original) The method as recited in claim 63, further comprising:

providing an alkyl to the chamber via an alkyl conduit in fluid communication with the reaction gas inlet;

providing ammonia to the chamber via an ammonia conduit which passes through the reaction gas inlet; and

wherein ammonia conduit is configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

100. (Original) The method as recited in claim 63, further comprising:

providing an alkyl to the chamber via an alkyl conduit in fluid communication with the reaction gas inlet;

providing ammonia to the chamber via an ammonia conduit which passes through the reaction gas inlet; and

wherein the inner ammonia conduit and the outer alkyl conduit are configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

101. (Original) The method as recited in claim 63, further comprising:

providing an alkyl to the chamber via an alkyl conduit in fluid communication with the reaction gas inlet;

providing ammonia to the chamber via an ammonia conduit which passes through the reaction gas inlet; and

wherein the inner alkyl conduit and the outer ammonia conduit are configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

102. (Original) The method as recited in claim 63, further comprising:

providing a first gas to the chamber via an outer;

providing a second gas to the chamber via an inner tube disposed at least partially within the outer; and

wherein the outer tube and the inner tube are configured so as to enhance separation of first and second gases prior to introduction thereof into the chamber.

103. (Original) The method as recited in claim 63, further comprising:

providing a first gas to the chamber via an outer;

providing a second gas to the chamber via an inner tube disposed at least partially within the outer; and

wherein the outer tube and the inner tube are configured generally concentrically with respect to one another, so as to enhance separation of alkyls and ammonia prior to introduction thereof into the chamber and so as to enhance mixing of the alkyls and ammonia subsequent to introduction thereof into the chamber.

Claims 104-111 (Canceled)

112. (Original) A method for chemical vapor deposition, the method comprising:

providing a reaction chamber;

providing a wafer carrier disposed within the chamber;

rotating the wafer carrier being so as to facilitate outward flow of reaction gas due to centrifugal force.

113. (Original) The method as recited in claim 112, wherein rotating the wafer carrier comprises rotating the wafer carrier at greater than approximately 500 rpm.

114. (Original) The method as recited in claim 112, wherein rotating the wafer carrier comprises rotating the wafer carrier at between approximately 100 rpm and approximately 1500 rpm.

115. (Original) The method as recited in claim 112, wherein rotating the wafer carrier comprises rotating the wafer carrier at approximately 800 rpm.

116. (Original) The method as recited in claim 112, wherein reaction gases are maintained separate from on another until the gases are inside of the chamber.

117. (Original) The method as recited in claim 112, further comprising:

communicating a first reaction gas via an outer fluid conduit to the chamber;

communicating a second reaction gas via at least one inner fluid conduit disposed within the outer fluid conduit to the chamber; and

wherein the inner and outer fluid conduits facilitate separation of the reaction gases.

118. (Original) The method as recited in claim 112, further comprising:

communicating a first reaction gas via a outer fluid conduit to the chamber;

communicating a second reaction gas via at least one inner fluid conduit disposed within the outer fluid conduit to the chamber; and

wherein the inner and outer fluid conduits are generally concentric with respect to one another and facilitate separation of the reaction gases.

Claims 119-123 (Canceled)

124. (Original) A method for chemical vapor deposition, the method comprising:

providing a reactor chamber contain at least one wafer; and

heating the wafer(s) via a heater disposed outside of the chamber.

125. (Original) The method as recited in claim 124, further comprising supporting the wafer(s) with a wafer carrier.

126. (Original) The method as recited in claim 124, further comprising rotating a wafer carrier within the chamber.

127. (Original) The method as recited in claim 124, further comprising defining a bottom of the chamber with a wafer carrier which is configured to rotate within the chamber and to support a plurality of wafers.

128. (Original) The method as recited in claim 124, further comprising:

defining a bottom of the chamber with a wafer carrier which is configured to rotate within the chamber and to support a plurality of wafers; and

mitigating a flow of gas between the wafer carrier and a side portion of the chamber with a ring seal.

Claims 129-130 (Canceled)

131. (Original) A method for chemical vapor deposition, the method comprising;

providing a plurality of reactor chambers;

providing reaction gases to the chambers via a common gas supply; and

removing gases from the chambers via a common gas exhaust system.

132. (Original) The method as recited in claim 131, further comprising supporting less than twelve wafers upon a wafer carrier disposed within each chamber.

Claims 133-159 (Canceled)

160. (Original) A method for chemical vapor deposition comprising heating at least one wafer which is disposed within a reactor chamber with at least one heater which is disposed outside of the reactor chamber.